***TOPIC:*** Types Of Foam Proportioners, Eductors, And Nozzles

***TIME FRAME:*** :30

***LEVEL OF INSTRUCTION:*** Level I

***BEHAVIORAL OBJECTIVE:***

*Condition:* A written quiz

*Behavior:* The student will identify characteristics of foam proportioners, eductors and nozzles.

*Standard:* With a minimum of 80% accuracy

***MATERIALS NEEDED:***

- One (1) foam proportioner
- One (1) eductor
- One (1) foam nozzle
- Appropriate visual aids and equipment

***REFERENCES:***

- IFSTA, Essentials of Fire Fighting, 5th Edition, Chapter 14
- NFPA, Fire Protection Handbook, Chapter 19
- Colletti, Class A Foam: Best Practices for Structure Firefighters, 1998

***PREPARATION:*** Fighting fires with foam requires the use of equipment specifically designed to mix foam concentrate with water and air. Foam can be mixed without this special equipment, but it will not be as effective in firefighting applications.

| PRESENTATION | APPLICATION |
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## I. FOAM PROPORTIONER

How is foam introduced into the fire streams?

A. A device used to inject the correct amount of foam concentrate into the water stream to make the foam solution

B. Correct proportion of foam and water is necessary for production of the optimum quantity and quality of foam

C. Selection of a proportioner depends on:

1. The foam solution flow requirements
2. Available water pressure

D. There are two general types of proportioners:

Information Sheet #1

1. Foam concentrate pump proportioner
   a. Automatic systems
      (1) Balanced pressure bladder
      (2) Balanced pressure pump
      (3) Electronic direct injection
   b. Automatically provides the proper concentrate/water solution over wide range of flows and pressures utilizing an external pump for concentrate
2. Water pressure proportioner
   a. Manual foam proportioners
      (1) Eductors
      (2) Around the pump sytems
      (3) Self educting nozzles
   b. Venturi type induction

| PRESENTATION | APPLICATION |
|---|---|
| (1) Especially suited for low water pressure systems or where foam concentrate pumps are not usable | |
| **II. FOAM-NOZZLE EDUCTOR** | Information Sheet #2 |
| A. Utilizes a venturi action to draft concentrate | |
| B. Can draw concentrate up to a height of 6 feet | |
| C. Solution is aerated by the nozzle immediately after the proportioner | |
| D. Cumbersome due to the fact the proportioner must be in the proximity of the nozzle | |
| **III. IN-LINE EDUCTOR** | What is a **in-line** eductor?<br>Information Sheet #3 |
| A. Separate from the nozzle | |
| 1. Thirty five (35) percent pressure loss creates the required vacuum to “pull” the foam | |
| a. Eductor must match the water flow and nozzle | |
| (1) i.e. 125 gpm eductor = 125 gpm nozzle | |
| 2. Maximum distance from the eductor to the nozzle varies with manufacturer, but not to exceed 200 feet | |
| 3. There is no maximum distance between the apparatus pump and the eductor | |
| B. Utilizes venturi, action to draft concentrate | |
| C. Allows foam solution to be pumped to remote location for aeration | |
| D. Can be connected directly to the nozzle | |
| E. Can supply multiple nozzles | |
| F. Simplest & least expensive | |

| PRESENTATION | APPLICATION |
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| **IV. FOAM APPLICATORS** | |
| A. Foam Nozzles | |
| 1. Aerated to add air to foam solution at nozzle | |
| 2. Some can be adjusted to change the foam application pattern | |
| 3. May have eductor as part of the nozzle | |
| B. Foam Sprinklers | |
| | Where would foam sprinklers be found? |
| 1. Found at fixed location foam deluge and foam water systems | |
| 2. Utilize a venturi action to mix air into the foam making section | |
| 3. Come in upright and pendant designs with deflectors designed to meet installation requirements | |
| C. Water fog nozzle used with foam solutions | |
| | Information Sheet #4 |
| | Can regular fog nozzles be used as foam nozzles? |
| 1. Breaks foam solution into tiny droplets | |
| 2. Best application is with AFFF and Class A foams | |
| 3. Not as effective as air aspirating foam nozzles | |
| D. High Back Pressure Aspirators | |
| 1. An in line aspirator used in situations requiring foam to be delivered under pressure | |
| 2. Best suited for subsurface injection | |
| 3. Produces a low-air-content but homogenous and stable foam | |
| E. High Expansion Foam Generators | |

| PRESENTATION | APPLICATION |
|---|---|
| | How is high expansion foam produced? |

1. Produce a high-air content, stable foam
2. Air content ranges from 100 to 1,000 parts of air to one part of concentrate
3. Types
   - a. Mechanical blower
     - (1) Resemble smoke ejectors
     - (2) Forces air through foam spray
     - (3) Produce higher air-content foam
     - (4) Typically associated with total flooding applications
   - b. Water Aspirating
     - (1) Similar to foam producing nozzles, except larger
     - (2) Back of nozzle is open to air flow
     - (3) Typically produce a lower-air-volume foam than do the mechanical blowers

***SUMMARY:***

Foam concentrate must be injected into the water stream and aerated to be most effective. Foam eductors/proportioners accomplish this task and are used with a variety of nozzles.

***EVALUATION:***

A written quiz.

***ASSIGNMENT:***

To be determined by instructor(s).